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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YUKIYASU SUGANO, MASAHIRO FUJINO, MICHIO MANO,
AKIHIKO ASANO, MASUMITSU INO, TAKENOBU URAZONO,
and MAKOTO TAKATOKU

Appeal 2008-5619
Application 09/478,812
Technology Center 2800

Decided: January 26, 2009

Before MAHSHID D. SAADAT, ROBERT E. NAPPI,
and MARC S. HOFF, *Administrative Patent Judges*.

SAADAT, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from a Final Rejection of claims 11, 12, 17, 18, 27, 28, 39, 40, 53, 54, 63, 65, 73, and 74. Claims 1-10, 13-16, 19-26, 29-38, 41-52, 55-62, 64, and 66-72 have been canceled. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

STATEMENT OF THE CASE

Appellants have invented a method for crystallizing semiconductor thin films in semiconductor devices, and more specifically, to a method of using laser irradiation for uniform crystallization of a prescribed region of the thin film (Spec. 9-10). Claim 11, which is representative of the claims on appeal, reads as follows:

11. A thin film semiconductor device comprising a semiconductor thin film, a gate insulating film accumulated on one surface thereof, and a gate electrode accumulated entirely within a prescribed region of said semiconductor thin film through said gate insulating thin film,

wherein said semiconductor thin film includes polycrystalline silicon having a first particle diameter, wherein said polycrystalline silicon is an irradiation converted substrate that in the prescribed region has a 30 to 80 nm layer of amorphous silicon or polycrystalline silicon having a second particle diameter that is larger than said first particle diameter;

a thin film transistor integrated in said prescribed region through said semiconductor thin film, wherein said converted polycrystalline silicon semiconductor film has a single-shot irradiated region, and

a cross sectional shape of said energy beam is adjusted with respect to said prescribed region to consist of irradiating said prescribed region in its entirety at a time by a single shot irradiation, so that characteristics of said thin film transistor are made uniform; and

whereby said single-shot irradiated region is a borderless irradiated region; and

wherein said semiconductor thin film is accumulated without exposing said substrate to air to accumulate said semiconductor thin film.¹

The Examiner relied on the following prior art relied in rejecting the claims on appeal:

| | | |
|----------|--------------|--|
| Noguchi | US 5,529,951 | Jun. 25, 1996 |
| Tanaka | US 5,798,744 | Aug. 25, 1998 |
| Yamazaki | US 6,037,197 | Mar. 14, 2000 (filed Jul. 13, 1997) |

Claims 11, 27, 39, 53, 63, and 73 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Noguchi.

Claims 12, 28, 40, 54, 65, and 74 stand rejected under 35 U.S.C. § 103(a) based upon the teachings of Noguchi and Tanaka.

Claim 17 stands rejected under 35 U.S.C. § 103(a) based upon the teachings of Noguchi and Yamazaki.

Claim 18 stands rejected under 35 U.S.C. § 103(a) based upon the teachings of Noguchi and Tanaka.

We make reference to the Appeal Brief (filed Jan. 25, 2008) and the Answer (mailed Mar. 17, 2008) for the respective positions of Appellants and the Examiner.

ISSUE

The issue is whether Appellants have shown that the Examiner erred in rejecting the claims under 35 U.S.C. §§ 102 and 103. Appellants do not dispute the teachings of Noguchi, Tanaka, or Yamazaki and merely contend

¹ For the correct copy of the claims, instead of referring to the claim appendix of the Appeal Brief, we rely on the amendment to the claims filed Jun. 15, 2006.

that the above mentioned process limitations in the claims do ascribe a structural feature which distinguish the devices made by such processes from the prior art devices (Br. 8-9). The issue specifically turns on whether the Examiner has given proper weight to the claimed process limitations and, if so, whether the Noguchi alone and in combination with Tanaka and Yamazaki teaches the claimed subject matter in claims 11, 39, and 73. The specific limitations are identified by Appellants as “accumulated without exposing the substrate to air” in claim 11, “pulse laser light” in claim 39, and “substrate is cooled” in claim 73 (Br. 7-8).

Appellants’ arguments are focused only on these process limitations and whether such limitations were fully considered in their stated rejection (Br. 8). However, only those arguments actually made by Appellants have been considered in this decision. Arguments which Appellants did not make in the Brief have not been considered and are deemed waived. *See* (37 C.F.R. § 41.37(c)(1)(vii)).

PRINCIPLES OF LAW

The patentability of a product does not depend on its method of production. If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe, et al.*, 777 F.2d 695, 698 (Fed. Cir. 1985). The court also stated that “Regardless of how broadly or narrowly one construes a product-by-process claim, it is clear that such claims are always to a product, not a process.” *SmithKline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 1317(Fed. Cir. 2006).

ANALYSIS

Claim 11

With respect to claim 11, Appellants specifically contend that the recited film accumulated without exposing the substrate to air implies “a non-oxidized structure in the accumulated film thickness” and is not taught in prior art (Br. 9). Appellants argue that by employing such a repeating process in vacuum, a step of removing contamination substances can be eliminated (*id.*). Appellants further assert that the anticipation rejection is improper because of the Examiner’s failure to give weight to the limitation of “accumulated without exposing the substrate to air,” which was neither expressly nor inherently described in the prior art (Br. 10).

The Examiner responds (Ans. 9) that the process limitation at issue is discussed in Appellants’ disclosure (e.g., page 17) as accumulating the thin film having an extremely good crystallinity. The examiner asserts that Noguchi teaches the only distinct structure resulting from the recited process which is a single thin film including polycryatalline silicon (Ans. 10). Additionally, the Examiner points out that Noguchi’s polycrystalline thin film is not an oxidized film which is the same as the thin film resulted from the recited process limitation (Ans. 11).

Initially, we remain unconvinced by Appellants’ arguments that the Examiner failed to give weight to the recited process limitations. In that regard, we agree with the Examiner’s interpretation of the product recited in claim 11 in that the process limitation of “accumulated without exposing the substrate to air” delimits the claim only to the extent that the final structure is affected by such structure, i.e., non-oxidized silicon film. Consistent with *In re Thorpe*, the Examiner has properly read the claim on the product

described in Noguchi which includes the same non-oxidized polycrystalline silicon film resulted from the recited process limitation.

Additionally, Appellants' argument (Br. 9) that processing the thin film in vacuum eliminates the need for removal of contaminants is not relevant to the final structure of the product processed by the claimed method. Whether the contaminants are removed in an additional step or not has no bearing on the final structure. According to the holding in *SmithKline, supra.*, the claim is construed as a product claim including a polycrystalline film where only the processes that affect the final structure can distinguish the claim over the prior art structures.

Claim 39

Appellants state (Br. 11) that the limitation of "irradiated with pulse laser light" should also be considered for the structure implied by the claimed process as described in the Specification. The Examiner responds (Ans. 11) that the only definitive structure resulting from the claimed process according to the relevant portions of the disclosure is formation of a polycrystalline silicon film, which is taught by Noguchi.

We find reasonable the Examiner's position with respect to construing the claimed process limitation in terms of the final structure resulting from such process as nothing more than a polycrystalline silicon thin film. The portions of the Specification mentioned by Appellants merely describe the intermediate stages of the polycrystalline layer formation while the final structure is still a polycrystalline thin film. Therefore, we do not agree with Appellants that such process limitation has been given no weight and find that, in fact, Appellants have the burden of distinguishing the claim, in terms of the final structure, over the prior art.

Claim 73

Similar to claim 39, Appellants merely assert that the Examiner has not properly considered the process limitation of “substrate is cooled” in claim 73 which implies a structure that has uniform crystal particle diameter (Br. 11). The Examiner again asserts that the final structure resulting from the cooling process is a polycrystalline silicon film, which is disclosed by Noguchi (Ans. 11). The Examiner further argues that the recited process limitation, even when the disclosed feature of increasing the probability of generation of crystal nuclei (Spec. 95) is considered, still results in a polycrystalline silicon film, as disclosed by Noguchi.

For the same reasons we discussed above with respect to claim 39, we find that Appellants have not shown how the final structure of claim 73 differs from the structure of Noguchi. In that regard, Appellants have not met the burden of identifying the structural differences that distinguish the claimed thin film over the prior art polycrystalline silicon film.

CONCLUSION

For all of the above discussed reasons, we find no error in the Examiner’s position that the final structure resulting from the claimed process steps reads on the polycrystalline silicon film disclosed by Noguchi or its combination with Tanaka and Yamazaki. Accordingly, we sustain the 35 U.S.C. § 102 rejection of claims 11, 27, 39, 53, 63, and 73 as being anticipated by Noguchi and the 35 U.S.C. § 103 rejection of the remaining claims over Noguchi in combination with Tanaka and/or Yamazaki.

Appeal 2008-5619
Application 09/478,812

DECISION

The decision of the Examiner rejecting claims 11, 12, 17, 18, 27, 28, 39, 40, 53, 54, 63, 65, 73, and 74 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. 1.136(a)(1)(iv).

AFFIRMED

gvw

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